

Mango peels disinfection: its impact on microbiological safety, phytochemical composition and antioxidant activity

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Abstract

It is estimated that 15-25 million tonnes of mango peels and stones are produced annually. The incineration or deposition of these by-products in landfills represent a severe environmental problem. About 300 research papers were published in the last two decades about mango peels' phytochemical composition, bioactive properties, processing and applications in the food industry. Most of them demonstrated that mango peels had a high potential to develop food ingredients or natural additives with high fiber and phenolic compounds content. Usually, mango peels processing into food ingredients/additives starts with a disinfectant washing to remove dirt particles and reduce microbial load. However, there is little information about the impact of washing conditions on mango peels' composition and properties. This study aims to fill this lack of knowledge. Sodium hypochlorite (SH) and peracetic acid (PAA) are the most used disinfectants for washing food products. So, in this study, two Box-Behnken Designs were performed, one for each disinfectant. The impact of three washing variables (food product to disinfectant solution ratio (X_A), SH or PAA concentration (X_B) and disinfectant time (X_C)), with 3-levels each (X_A : 1:1, 1:5, 1:10 (kg:L); X_{BSH} : 0, 100 and 200 mg/L; X_{BPAA} : 0, 40 and 80 mg/L; X_C : 1, 10, 19 min) on total mesophilic aerobic bacteria, total yeasts and moulds, dry matter, ash content, total phenolic compounds, total carotenoids and antioxidant capacity through the DPPH and ABTS methods, was evaluated. The SH and PAA optimal disinfection conditions were determined, considering each parameter individually or performing a multi-criterion optimization. After, other batch of mango peels was washed according to SH and PAA optimal disinfection conditions. Besides analyses mentioned before, *Enterobacteriaceae*, *Bacillus cereus* and total protein were evaluated. Significant statistical models were found for all parameters analysed, excluding total yeast and moulds (not detected), ash content, and ABTS assay (in PAA Design). The increase of disinfectant concentration and disinfection time improved mango peels' microbiological safety. However, high levels of these washing variables impaired dry matter, total carotenoids and antioxidant activity. More studies are needed about the effect of washing conditions on total phenolic compounds. According to multi-

criterion optimization, the SH and PAA optimal washing conditions were $X_A=1:9$ (kg:L), $X_B=200$ mg/L, $X_C=90$ s and $X_A=1:1$ (kg:L), $X_B=27$ mg/L and $X_C=19$ min, respectively. The application of SH and PAA optimal washing conditions significantly improved the mango peels' microbiological safety and did not cause marked changes on their phytochemical composition and antioxidant activity.

Keywords: mango by-products; washing; sodium hypochlorite; peracetic acid; bioactive compounds

References

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